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Injury Prevention in Adolescent Female Athletes in Western Connecticut

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Problem Identification and Need

- Sports are the leading cause of injury in adolescents accounting for >30% of injuries in this population (Emery, Roy et al. 2015).
 - In Western Connecticut an Orthopedic surgeon stated that he does about 25 ACL reconstructions/year mostly in young people under the age of 25 (see Community Perspective) and that other surgeons in the area specializing in ACL reconstructions exceed 100/year.
- Sport injuries can be devastating, having long-term psychosocial and physical consequences especially in adolescent females (Joreitz, Lynch et al. 2016) (Manuel, Shilt et al. 2002) (Podlog, Dimmock et al. 2011).
- No intervention completely prevents injury.
- Studies have shown that Injury Prevention Programs (IPPs) do reduce injury rates and there is a lack of knowledge in this area by coaches, players, and parents (Emery, Roy et al. 2015)(Barengo, Meneses-Echavez et al. 2014).

Public health cost and unique cost considerations in host community

- Physical inactivity is the 4th leading risk factor for diabetes, cardiovascular disease, and some cancers, which has led to promoting population based physical activity as a global public health priority ((WHO) 2009).
- Physical activity has its risks:
 - Financial loss due to football injuries in the English Premiere League in 1999-2000 was estimated at 118 million euros, and estimated direct and indirect costs of these injuries in the Netherlands in 2008 were 1.3 billion euros/year ((FIFA) 2007)(Woods, Hawkins et al. 2002).
 - Injuries involving soft tissue, ligaments, tendons, muscles, and nerves account for 2 million hospitalizations, 6.5 million outpatient visits, 18 million emergency department visits, 64 million physician office visits, and an annual cost of \$28 billion (Manuel, Shilt et al. 2002).
 - Injuries can lead to decreased sport participation and all-cause mortality, obesity, and post-traumatic osteoarthritis (Blair, Kohl et al. 1995)(Richmond, Fukuchi et al. 2013).
 - More than 25% of individuals with ACL injuries do not return to previous activity levels even after successful surgery and rehabilitation (Padua, DiStefano et al. 2015).
- More than 100,000 ACL reconstructions are performed annually in the US (Brown, 1999).
 - Orthopedic surgeons in Western Connecticut who specialize in ACL reconstructions exceed 100/year.
- Female athletes are reported to be up to 10X more prone to ACL injuries during participation in the same high-risk activities compared to males (Gwinn, Wilckens et al. 2000).
- Studies have shown that IPPs are effective in reducing injury rates at minimal financial cost (Emery, Roy et al. 2015).
 - Most of these strategies included components of balance, agility, and strength along with emphasizing the importance of stretching (Lewis, 2014).
 - FIFA 11+ warmup has been implemented worldwide and has been shown to decrease youth soccer injury rates by 30-70% (Barengo, Meneses-Echavez et al. 2014).
 - IPPs have been found to be effective in the school-based setting (Richmond, Kang et al. 2016).

Community Perspective

- Interview with [Name withheld], Orthopedic Surgeon, Orthopedic Specialists of CT
 - Orthopedic Surgeon for over 20 years with a fellowship in Sports Medicine
 - He does 250 knee arthroscopies/year.
 - 25 ACLs/year, 2/month
 - Mostly young people under the age of 25
 - About 50:50 male:female ratio
 - Very high rate of injuring contralateral knee
 - He thinks there is a rise in incidence of knee injuries in young women, which he attributes to more women playing high level sports with the passage of Title IX.
 - He is personally unsure about the effectiveness of IPPs, specifically on getting girls to “land better.” Much of the research initially thought to be promising has since been brought into question. He would like to see more research on specific team-based warmups in the United States.
- Interview with [Name withheld], Field Hockey Coach, Competitive Edge Field Hockey
 - Competitive Edge Field Hockey Club Coach for over 10 years
 - At least a few of her older girls go on to play college field hockey every year.
 - None of her girls have gotten seriously injured playing on one of her teams.
 - She sees mostly contusions from getting hit with the ball and ankle sprains.
 - She emphasizes dynamic warmups and stretching well for injury prevention to protect her girls.
 - She hasn’t specifically heard about Fita11+ or IPPs, but is interested in learning more about them.
 - She feels responsible for her girls when they are playing for her, and wants to do everything she can to protect them from injuries.
 - In general she is conservative when her girls are injured, preferring to have them sit for longer rather than coming back to soon.
 - She’s had multiple girls with overuse tendonitis injuries, so she makes sure to give them time to rest.

Community Perspective

- Interview with [Name withheld], Athletic Trainer, University of Vermont
 - Athletic trainer for 19 years
 - She is passionate about injury prevention.
 - She saw the “devastation” that injuries would have in young athlete’s lives. Injuries also affected their families, schools, and communities. She saw athletes “lose their identities.”
 - Over years of experience she saw injuries happening younger and younger as athletes began playing year round.
 - She is helping run the FIFA 11+ three year study of 14 high schools in Vermont.
 - FIFA 11+ injury prevention program has the most research behind it.
 - Soccer and one study in girls basketball
 - Comparing injury rates between 7 FIFA 11+ schools and 7 control schools
 - Multiple sports
 - If successful they hope to expand statewide and/or nationwide.
 - She is truly hopeful that this program will help prevent injuries and improve athletic performance as a whole.

Intervention and Methodology

- Intervention: Increase awareness of the impact of injuries and injury prevention methods in adolescent female athletes.
- Methodology:
 - 10 minute workshop for a group of 56 adolescent female field hockey players with facts about injury rates in their sport and simple things they can do to prevent injuries
 - 5 question multiple choice pre and post-talk anonymous surveys about their knowledge of adolescent and college injuries
 - Same questions
 - Answers given in the talk
 - 1 page pamphlet of talk outline and major takeaways

Age: (Circle your age)
1. 13-15 years old
2. 16-18 years old

Pre-Talk Survey

1. What's the most common type of injury in NCAA field hockey from 2004-2009? (Circle the correct answer)
 - a. Muscle Strains
 - b. Contusions/Bruises
 - c. Sprains
 - d. Fractures
 - e. Concussions
2. True or False: Stretching before warming up has been shown to decrease rates of injury. (Circle the correct answer)
3. What percentage of injuries in the NCAA from 2004-2009 resulted in surgery? (Circle the correct answer)
 - a. 33%
 - b. 12%
 - c. 6%
 - d. 2%
 - e. 45%
4. True or False: When I am experiencing a lot of pain I should not tell anyone and continue to train through it. (Circle the correct answer)
5. Within 7 years after ACL repair what percentage of individuals no longer play soccer? (Circle the correct answer)
 - a. 75%
 - b. 10%
 - c. 35%
 - d. 65%
 - e. 50%

Age: (Circle your age)
1. 13-15 years old
2. 16-18 years old

Post-Talk Survey

1. What's the most common type of injury in NCAA field hockey from 2004-2009? (Circle the correct answer)
 - a. Concussions
 - b. Contusions/Bruises
 - c. Muscle Strains
 - d. Fractures
 - e. Sprains
2. True or False: Stretching before warming up has been shown to decrease rates of injury. (Circle the correct answer)
3. What percentage of injuries in the NCAA from 2004-2009 resulted in surgery? (Circle the correct answer)
 - a. 6%
 - b. 2%
 - c. 45%
 - d. 33%
 - e. 12%
4. True or False: When I am experiencing a lot of pain I should not tell anyone and continue to train through it. (Circle the correct answer)
5. Within 7 years after ACL repair what percentage of individuals no longer play soccer? (Circle the correct answer)
 - a. 35%
 - b. 65%
 - c. 75%
 - d. 10%
 - e. 50%



Injury Prevention in Adolescent Female Athletes

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Injuries in Adolescent Athletes

- Sports are the leading cause of injury in adolescents accounting for >30% of injuries in this population.
- Injuries can lead to decreased sport participation, obesity, and arthritis later in life.
- Injuries can have profound psychosocial consequences for young athletes.
- More than 25% of individuals with injury to a specific knee ligament called the anterior cruciate ligament (ACL) do not return to previous activity levels even after successful surgery and rehab.
- Within 7 years after ACL injury 65% of individuals no longer play soccer.

Field Hockey Specific

- In the NCAA from 2004-2009:
 - More than 10,000 injuries
 - Highest overall injury rate during preseason
 - Muscle strains, contusions, sprains, fractures, and concussions are the most common types of injuries
 - 13.1% of injuries resulted in 21+ days of time lost from play
 - 6.2% of injuries result in surgery

What you can do

1. Warm-up
 - Listen to your coaches and don't fool around.
2. Stretch
 - Stretching after 5-10 minutes of warm-up has the greatest impact on decreasing injury.
 - Both static and dynamic stretching have been shown to be beneficial.
 - In a static stretch, hold for 30 seconds, switch sides, and repeat.
3. Listen to your body
 - Use pain as your guide.
 - When you're supposed to rest actually rest to avoid overuse injuries and burnout.
4. If you do get injured keep your head up
 - Many athletes struggle coming back from injuries.
 - Lean on your support systems.

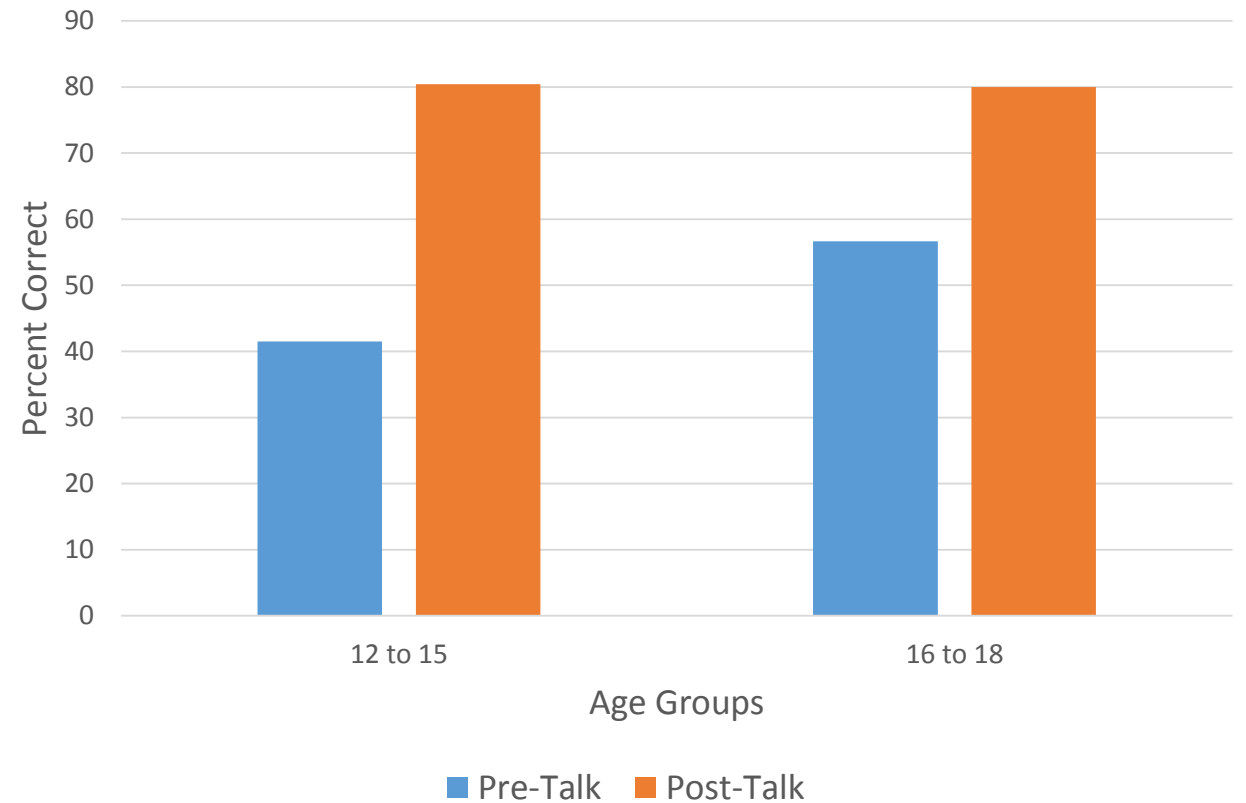
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Results/Response

- 56 female field hockey players
 - 12-15 year olds: 48
 - 16-18 year olds: 8
 - 31.1% average increase in % correct

	12 to 15 year olds	16 to 18 year olds
Pre-Talk % Correct	41.5	56.7
Post-Talk % Correct	80.4	80.0
Increase in % Correct	38.9	23.3



Evaluation of effectiveness and limitations

Strengths

- Project achieved its goal of increasing knowledge and awareness of injuries and injury prevention in adolescent female athletes in a short, easy to implement workshop that was broadly applicable to other field hockey teams and easily adaptable to other sports.
 - 15 minutes total
 - Improvement of 31.1% correct in the survey shows that the girls retained information
 - Pamphlet provided them with info to look back on

Weaknesses

- Only had access to 1 group of girls due to summer break and off-seasons
- Didn't have access to a group of coaches to teach about IPPs specifically

Recommendations for future interventions

- Help prevent injuries that may be avoided by simple stretching, warming up (with or without IPPs), and resting on off days – Expand the audience
 - Pamphlets, surveys, and talking points can be made available and adapted to other sports
 - Multiple sports and teams, possibly by targeting athletic trainers
- Increase knowledge of IPPs to further decrease injury rates – Discuss IPPs specifically with coaches and teach them
 - Target athletic directors of high schools, club teams, and Physical Education instructors in the area
 - Aiming for girls from around the age of 14 could prevent devastating injuries in high school and college sports
- Increase literature supporting the use of IPPs in the USA – Help expand FIFA 11+ study from Vermont to other areas of the country, such as Connecticut

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